REMARKS

Claims 1-64 were pending in the application. By this paper, claims 8-34 and 38-64 have been canceled without prejudice. Originally filed claims 1-7 and 35-37 remain pending in the application and claims 1 and 4 have been amended herein. Additionally, new claims 65-67 have been added herein for consideration.

Reconsideration and withdrawal of the various objections and rejections are hereby respectfully solicited in view of the foregoing amendments and the following remarks.

Election/Restriction

In accordance with the restriction requirement being made final, claims 8-34 and 38-64 have been canceled herein without prejudice. The applicant reserves the right to pursue the subject matter of these canceled claims in one or more timely filed related applications.

Claim Objections

Claims 1 and 4 have been objected to for containing informalities. Particularly, the recitation "means for generating a fluid flow into said inlet manifold, *though* each chamber *is* set array..." is said to be unclear. Claim 4 recited a similar recitation. Each of these claims has been amended as the examiner suggested. The objections are believed to be overcome.

Claim Rejections - 35 U.S.C. §103

Claims 1-4, 6, 7, 36, and 37 have been rejected under 35 U.S.C. §103(a) as obvious over Hoisington et al., U.S. Patent No. 4,835,554 (Hoisington) in view of Zhang, European Patent No. 0 810 093 A2 (Zhang). Claims 5 and 35 have been rejected as obvious over Hoisington in view of Zhang, and further in view of Burr et al., European Patent No. 0 622 210 A1 (Burr). These rejections are believed to be overcome in view of the foregoing amendments and the following remarks.

The official action has identified differences between the claimed invention and the disclosure of Hoisington. For example, the action correctly states that Hoisington does not teach or suggest the limitation of the resistance to flow of the inlet and outlet manifolds being chosen such that the static pressure at the orifice of any chamber in the array due to flow varies between any two chambers by an amount less than that which would give rise to significant differences in droplet ejection properties between any two chambers. This recited

manifold selection also ensures flow rates sufficient to keep foreign bodies in the flow of ink through the chamber and, thus, prevent them from blocking the orifice. However, there are other differences between Hoisington and the rejected claims.

Independent claim 1 recites an array of fluid chambers, each chamber being so connected with the inlet manifold and the outlet manifold as to enable a fluid flow from the inlet manifold, through each chamber in the array, and into the outlet manifold. Claim 1 also recites that the fluid flow through each chamber is "*sufficient to prevent foreign bodies in the fluid from lodging in the orifice.*" Claim 1 also recites that each chamber is associated with a means "***for effecting droplet ejection from said orifice simultaneously with said fluid flow through the chamber.***"

Independent claim 4, as amended, similarly recites an array of chambers, each chamber being so connected with the inlet manifold and the outlet manifold as to enable a fluid flow from the inlet manifold, through each chamber in the array, and into the outlet manifold. Claim 4 also recites "*said fluid flow through each chamber being simultaneous with droplet ejection* from said orifice *and being sufficient to prevent foreign bodies in the fluid from lodging in the orifice.*"

According to claims 1 and 4, the present invention provides *a flow through each ink ejecting chamber, even as ink is being ejected from the orifice associated with that chamber.* In other words, ink is ejected from an orifice simultaneously with flow through the chamber associated with the orifice. The flow through the chamber is larger than the flow out of the orifice, and is sufficient to prevent any foreign body in the chamber from entering and possibly blocking the orifice.

In contrast, Hoisington is directed to solving the problems of air bubbles collecting in the ink and settling of pigment in the ink, each of which occurs while the ink jet is not operating. Hoisington discloses a closed-loop ink path through which ink is circulated only *during quiescent periods, or during inactive periods, of the ink jet operation.* Hoisington discloses circulating ink through a closed-loop path when the ink jet head is not operational, and thus only while the ink jet orifices are not ejecting droplets. See Hoisington, the last sentence of the abstract, and at col. 2, lines 6-12.

Hoisington's teachings are counter to claims 1 and 4, each of which recites that *ink flows from the manifold inlet, through each chamber, to the manifold outlet, simultaneously with droplet ejection.* Droplet ejection can only occur during ink jet operation, not during

quiescent or inactive periods. Nowhere does Hoisington teach ink flow through its closed-loop path during ink jet operation. Thus, Hoisington fails to teach or suggest at least this limitation of claims 1 and 4.

Further, Hoisington also teaches that its closed-loop flow path is for use during inactive or quiescent periods and specifically "so as to *maintain pigment in suspension* and *transport ink containing dissolved air away* from the pressure chamber" to a de-aerator. See Hoisington at col. 2, lines 12-17, and also the abstract. In figures 1, 2 and 3, a heater 17 establishes convective ink flow through a de-aeration passage 16. Hoisington makes no mention of ink flow through its closed-loop path from a manifold inlet, through its chambers, to a manifold outlet, simultaneous with ejection of droplets from its orifices. Hoisington additionally makes no mention of *preventing foreign bodies of any kind from lodging in the orifices during droplet ejection by action of its closed-loop path.* Instead, the ink in Hoisington flows through the closed-loop path only during periods where the ink jet device is not operating, and only to prevent air bubbles forming and to maintain suspension of pigment in the ink. Therefore, in addition to the limitations identified in the official action as missing from Hoisington, these limitations are also missing.

The official action states that it would have been obvious to modify Hoisington in view of Zhang so that the resistance to flow of the inlet and outlet manifolds is chosen such that the static pressure at the orifice varies between any two chambers by an amount less than that which give rise to significant differences in drop ejection properties between the chambers in the array. However, Zhang also fails to disclose a flow of ink through the chambers, in the manner recited in claims 1 and 4, such flow being simultaneous with drop ejection. Zhang further fails to teach or suggest any such flow being to prevent foreign bodies in the ink from lodging in the ejection orifices during such flow. The combination of Zhang and Hoisington thus also fails to teach or suggest at least these additional limitations.

Moreover, contrary to the assertions in the official action, neither Hoisington nor Zhang provide the motivation or suggestion needed to modify Hoisington according to Zhang. One having ordinary skill in the art would have recognized that the entire teachings of Zhang are intimately connected with the geometry of the disclosed channels, cover, and manifold configuration. Zhang discloses a plurality of longitudinally extending walls that form parallel ink chambers which are closed by a cover. The cover includes the ink manifold. Zhang describes *and claims* in detail, Reynolds numbers and relative cross

sections of manifolds and channels, which are intimately tied to and necessary to achieve its disclosed flow resistance characteristics.

Modifying Hoisington according to Zhang would destroy the teachings of one or the other of the two references. The official action states that the motivation for such a combination would have been to gain the benefits described as being achieved by the Zhang ink jet apparatus. However, one cannot achieve the benefits of Zhang without employing the structure as taught by Zhang.

If one were to propose employing only the general flow resistance relationships of Zhang in modifying Hoisington, without employing Zhang's specifically described and claimed structure, the flow passage size and shape characteristics as taught by Zhang would be ignored. Thus, such a combination would be improper. Similarly, if one were to propose employing the flow resistance characteristics, along with the flow passage size and shape properties necessary to achieve them, as taught by Zhang in order to modify Hoisington, the teachings of Hoisington would be destroyed. Hoisington discloses vastly different, but equally important, flow paths, fluid chamber arrangements, and the like, in comparison to Zhang. Modifying Hoisington to incorporate the Zhang structure would require significantly changing the Hoisington structure, destroying its specific teachings. One having ordinary skill in the art would require hindsight, looking back from the applicants' claimed invention, in order to modify Hoisington according to Zhang.

Burr, cited in rejecting dependent claims 5 and 35, also fails to teach or suggest at least the same limitations of claims 1 and 4 discussed above. It is noted that Burr fails to disclose the flow of ink through the chamber simultaneously with drop ejection. Burr is concerned only with alternative flows during non-operational purging steps. Thus, the combination of Hoisington, Zhang, and Burr also does not teach or suggest all of the limitations of claims 1 and 4.

For all of the foregoing reasons, independent claims 1 and 4 and their corresponding dependent claims 2, 3, 5-7, and 35-37 are in condition for allowance.

New Claims 65-67

New method claims 65-67 have been added herein. These method claims read on the elected Species I, and the claimed method is achieved by employing an apparatus as recited in claims 1 and 4. No new matter has been entered, and no additional burden is believed to be placed on the examiner in order to consider these claims. Support for the new claims can

be found throughout the specification has filed, and particularly in paragraphs [0086], [0087], and [0090] of the application, published as US 2002/00118256. Claims 65-67 are believed to be in condition for allowance in view of the remarks set forth above with respect to the apparatus claims 1 and 4.

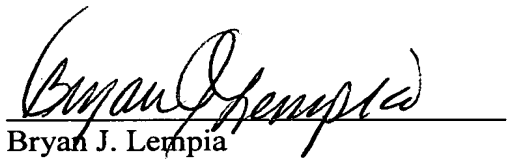
CONCLUSION

Claims 1-7, 35-37, and 65-67 are in condition for allowance in view of the foregoing amendments and remarks. Reconsideration and withdrawal of the various objections and rejections are hereby respectfully solicited.

The examiner is invited to contact the undersigned at the telephone number listed below in order to discuss any remaining issues or matters of form that will place this case in condition for allowance.

A petition for a three-month extension of time and the appropriate fee accompany this paper. No additional fee is believed due at this time. However, the Commissioner is hereby authorized to charge any fee deficiency, or to credit any overpayments, to Deposit Account No. 13-2855 of the undersigned's firm.

Respectfully submitted,



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